Status of the Photonuclear Data Library for CINDER'90

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Recently a renewed interest in photonuclear processes has appeared. It is motivated by a number of different applications where progress in high intensity electron accelerators was awaited. These applications include electron/photon accelerators, shielding studies, radioactive nuclear beam production, transmutation of nuclear waste, intensive neutron sources for material irradiation and ToF facilities, non-destructive characterization of waste barrels, detection of nuclear materials via photo-fission, etc.

Major problems in performing some modeling or optimization studies of above applications are the lack of photonuclear data for corresponding cross sections despite huge efforts of the IAEA: data are available only for 164 isotopes. In addition, no complete material evolution code including photonuclear reactions is available at the moment. For this reason, in a close collaboration with the LANL, we have been working on the development of a new photonuclear activation data library to be included into the CINDER'90 evolution code (LANL). The energy range of incident photons is between 0 and 25 MeV, and an extension of the present activation library up to 150 MeV is planned in the future.

The following photonuclear library construction strategy was chosen:
a) we use the IAEA evaluations for the major 164 isotopes;
b) the latest version of the ALICE code (HMS-ALICE) written by M. Blann is employed to complete the library up to 600 isotopes;
c) in some particular cases new evaluations with the GNASH code are performed (e.g., U-235, Pu-239, Np-237, Am-241);
d) the GSI fission-evaporation code is used to provide the photo-fission fragment distributions.

The accuracy of the calculated and evaluated cross sections is assessed through comparisons with experimental data when available. A companion paper describes developments and testing of the GSI fission-evaporation code for photon induced fission including delayed neutron emission.

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